Ireland, where it displayed considerable energy and occasioned hard gales over and near the British Isles during that and the following date. During the 11th the centre of disturbance moved eastward over the North Sea.

4.—This depression apparently originated north of the Bahamas, and on the morning of the 11th was central off the North Carolina coast, with pressure below 29.70 (754) and moderate to fresh gales. By the 12th the centre of disturbance had moved northeast to the thirty-ninth parallel, attended by gales of hurricane force, and pressure falling below 29.00 (737). On this date the lowest barometer reading reported during the month, 28.32 (719), was noted by Captain Saville, of the s. s. "Lemuria," at noon, in N. 36° 50′, W. 66° 58′. During the 13th the depression passed northeastward over Newfoundland, and thence advanced north of east and disappeared north of the British Isles after the 15th, its passage being attended by an apparent gradual decrease in energy.

5.—This depression was central over the Gulf of Saint Lawrence on the 14th, with central pressure below 29.40 (747). On the morning of the 15th the storm was central over Newfoundland, where pressure falling below 29.30 (744) was indicated, whence it moved north of east to the thirty-ninth meridian by the 16th, attended by fresh to whole gales. By the 17th the centre of depression had moved southeast to the forty-ninth parallel, after which it disappeared in the vicinity of the Azores. A marked loss of energy was evidenced on the part of this storm after the 16th.

6.—This depression was a continuation of low area vii which passed eastward over the Gulf of Saint Lawrence, with pressure below 29.30 (744). Advancing eastward to the thirtieth meridian by the 22d the storm-centre moved thence southeastward and disappeared northeast of the Azores, its course after the 20th being attended by gales of diminishing strength.

7.—This depression first appeared southwest of the British Isles on the 26th, where pressure falling to about 29.50 (749) and strong to whole gales were reported. By noon, Greenwich time, of the 27th the centre of depression had apparently moved eastward over the French coast.

OCEAN ICE IN FEBRUARY.

The following table shows the southern and eastern limits of the region within which icebergs or field-ice were reported for February during the last seven years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
February, 1883	42 01	52 46	February, 1883	46 19	45 44
February, 1884	42 00	50 00	February, 1884	46 50	43 45
February, 1885	41 50	51 12	February, 1885	47 52	42 00
February, 1886	46 10	47 15	February, 1886	48 00	44 47
February, 1887	40 00	48 00	February, 1887	46 26	41 50
February, 1888	44 59	45 08	February, 1888	44 59	45 08
February, 1889	45 35	48 00	February, 1889	45 35	48 00

From the above it will be seen that during February, 1889, ice was encountered about two and one-half degrees north and four degrees west of the average southern and eastern limits for the month, as determined from reports made during the preceding six years.

Field ice has been reported for February, 1889, as follows: 24th, s. s. "Mars," off the Banks, passed through small pieces of detached ice for thirty hours. Schr. "Herman Babion" (no date), eighty miles west one-half south of Saint Pierre, Miquelon, encountered heavy drift ice, which extended all the way to Scatari. Schr. "Cecil H. Low" (no date), twenty miles southwest from Scatari, heavy field ice. Ship "William Cochran," in N. 45° 35′, W. 48°, one piece of field ice fifty feet long, just awash.

No icebergs have been reported for February, 1889. This fact constitutes an unusual feature, as with the exception of the current and the preceding year, icebergs have been encountered over or near the Grand Banks in February since, and including, 1883. The field ice reported was also largely deficient, when compared with the average for the month.

FOG IN FEBRUARY.

The following are limits of fog-areas on the north Atlantic Ocean during February, 1889, as reported by shipmasters:

Date.	Entered.		Cleared.		Date.	Entered.		Cleared.	
	Lat. N.	Lon. W.	Lat. N.	Lon. W.		Lat. N.	Lon. W.	Lat. N.	Lon. W.
	° ′	° ′	° ′	° ′		° ′	° ′	° ′	° ′
1	45 12	50 28	45 06	51 13	16–17	40 48	73 00	Sandy Hook.	
4	45 26	49 39	45 43	48 30	17	41 00	66 30	40 45	67 33
4	44 02	48 32	43 38	50 15	17	40 39	68 32	40 27	70 13
4–5	44 37	46 56	42 28	52 36	17	39 55	68 48	40 25	69 10
4–5	42 50	49 50	43 50	53 40	17–18	35 25	75 20	37 00	75 30
4–5	45 41	50 48	46 30	47 44	18	40 27	73 55	New York.	
6	43 11	53 24	43 27	52 33	18	40 28	70 15	40 40	71 00
6–7	42 50	60 30	42 30	63 30	18	41 40	53 30	41 22	64 20
7	45 15	43 35	45 36	42 38	18–19	44 35	55 30	43 36	56 30
7	42 39	52 36	42 50	50 20	18–19	42 51	50 55	42 40	53 59
7–8	48 06	43 35	45 55	49 05	19	46 08	57 12	45 35	58 16
12	43 19	48 41	42 55	49 59	19	43 45	54 34	43 37	55 56
13	45 20	51 07	45 20	53 30	19–20	46 57	45 04	47 36	42 09
13–14	42 45	49 07	42 54	48 35	19–20	45 30	47 30	44 50	51 09
15	32 06	80 32	32 08	80 35	20	44 27	51 37	45 14	54 12
16–17	35 35	75 20	NE. light-ship.		24	44 49	47 58	45 01	48 37
16–17	Galveston.		27 30	91 30					

The limits of fog-belts west of the fortieth meridian are shown on chart i by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on thirteen days, as compared with five days for January, 1889, and seventeen days for February, 1888. Between the fifty-fifth and sixty-fifth meridians fog was reported on four days, as compared with ten days in January, 1889, and eight days in February, 1888. To the westward of the sixty-fifth meridian fog was reported on three days, as compared with five days in January, 1889, and eleven days in February, 1888. As compared with the preceding month a marked increase in fog frequency is shown near the Grand Banks, while to the westward of the fifty-fifth meridian there has been a decrease. The southern limit of fog has extended southward over the trans-Atlantic tracks east of the fifty-fifth meridian.

During the 16th and 17th dense fog was encountered in the Gulf of Mexico from Galveston, Tex., east-southeast to about W. 91° 30′, with rain, s. to sse. winds, and fresh ssw. winds at times. On the 15th fog was reported off Savannah, Ga., with variable winds and rain. On the 1st, 4th, 12th to 14th, and 18th to 20th fog was reported over or near the Banks of Newfoundland, with south to east winds, occasioned by the approach or passage of areas of low pressure. From the 5th to 8th, inclusive, fog occurred in that region, attending the passage of an area of low pressure from over the middle Atlantic states to the north of Newfoundland, and on the 24th fog was noted, with fresh, variable winds. On the four dates for which fog was reported between the fifty-fifth and sixty-fifth meridians, areas of low pressure were located, respectively, over New England, the middle Atlantic states, and the Gulf of Saint Lawrence. Fog was reported off the Atlantic coast of the United States on the 16th, 17th, and 18th, with rain and variable winds. On the 18th a storm of considerable energy, which had advanced from the southwest, was central over the middle Atlantic states.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for February, 1889, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperatures and the departures from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the

columns for mean temperature show the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above.

The mean temperature was highest over southern Florida, where it rose to 69°.4 at Key West, and over the southern extremity of Louisiana, where a reading of 66°.7 was noted at Port Eads. Values above 55° were reported in Florida south of the twenty-ninth parallel, along the west Gulf coast, in the lower Rio Grande valley, over southern California, the southern extremity of Nevada, and southwestern Arizona. On the Pacific coast the means were above 50° south of the fortieth parallel and in, and west of, the Sacramento and San Joaquin valleys, while along the immediate coast north of the fortieth parallel they rose to or above 45°. The lowest mean temperature for the month occurred in Manitoba, where a reading of —5° was noted at Winnipeg. A line representing a mean temperature of zero is traced from western Manitoba southeastward over the valley of the Red River of the North to Moorhead, Minn., and thence north of east to Port Arthur, Ont. Within a limited area in south-central Colorado values below 15° were reported. The mean temperature was below 32° north of a line traced from the Atlantic coast in about Lat. N. 37°, westward to the Mississippi Valley, and thence west-southwest to central New Mexico and central Arizona, and east of this line continued from central Arizona irregularly west of north over the plateau regions.

The mean temperature was generally below the normal in the middle and southern Rocky Mountain districts and over the entire eastern half of the country, except at stations in south-central and eastern Nova Scotia. It was above the normal from the upper Missouri valley westward over the northern Rocky Mountain districts to the Pacific coast, and thence southward over California. The most marked departures below the normal were noted east of the Mississippi River and from the southern portion of the Lake region southward to the Gulf of Mexico, where they exceeded 5°. The greatest excesses in temperature occurred at stations in Dakota, northern Montana, northwestern Washington, and the middle and upper Saskatchewan valley, where the means were 5° or more above the average for the month. In Nova Scotia the departures above the normal varied from 1° at Halifax, N. S., to 4° at Sydney, C. B. I.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.		Below normal.	
Fort Assinaboine, Mont	8.8	Detroit, Mich	8.6
Olympia, Wash	5.6	Jacksonville, Fla	8.6
Fort Sully, Dak	5.0	Chicago, Ill	8.1
Portland, Oregon	4.2	Savannah, Ga	8.0
San Diego, Cal	4.0	Cincinnati, Ohio	7.7

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for February, 1889; (4) the departure of the current month from the normal; (5) and the extreme monthly means for February during the period of observation and the years of occurrence:

State and Station.	County.	(1) Normal for the month of Feb.	(2) Length of record.	(3) Mean for Feb., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for February.			
						Highest.	Year.	Lowest.	Year.
Arkansas.		°	*Years*	°	°	°		°	
Lead Hill	Boone	39.7	7	36.7	—3.0	49.9	1882	32.2	1885
California.									
Sacramento	Sacramento	50.5	33	44.9	—5.6	55.0	1877'79	43.7	1887

Deviations from normal temperatures—Continued.

State and Station.	County.	(1) Normal for the month of Feb.	(2) Length of record.	(3) Mean for Feb., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for February.			
						Highest.	Year.	Lowest.	Year.
Colorado.		°	*Years*	°	°	°		°	
Fort Lyon	Bent	32.3	20	28.5	—3.8	39.1	1867	23.1	1883
Connecticut.									
Middletown	Middlesex	26.6	21	23.5	—3.1	34.5	1867	17.7	1885
Florida.									
Merritt's Island	Brevard	64.2	6	58.0	—6.2	69.4	1887	58.0	1889
Georgia.									
Forsyth	Monroe	51.8	15	48.0	—3.8	58.1	1883	44.5	1885
Illinois.									
Peoria	Peoria	29.3	33	26.0	—3.3	39.3	1882	15.5	1875
Riley	McHenry	22.3	33	15.7	—6.7	32.4	1882	4.7	1875
Indiana.									
Vevay	Switzerland	35.8	22	32.1	—3.7	45.5	1882	25.1	1885
Iowa.									
Cresco	Howard	15.5	17	11.0	—4.5	31.3	1878	1.0	1875
Monticello	Jones	21.4	36	17.9	—3.5	34.6	1878	7.5	1875
Logan	Harrison	24.0	15	22.9	—1.1	35.2	1877	12.6	1875
Kansas.									
Lawrence	Douglas	32.2	25	27.6	—4.6	41.6	1882	20.8	1885
Wellington	Sumner	32.1	10	31.5	—0.6	40.1	1882	24.6	1885
Louisiana.									
Grand Coteau	Saint Landry	58.7	6	54.8	—3.9	64.6	1887	52.4	1885
Maine.									
Gardiner	Kennebec	20.9	48	18.9	—2.0	28.7	1840	13.3	1838
Maryland.									
Cumberland	Allegany	31.0	30	28.0	—3.0	38.0	1877	19.4	1868
Massachusetts.									
Amherst	Hampshire	24.7	53	23.2	—1.5	31.4	1857	16.5	1843
Newburyport	Essex	26.3	10	24.4	—1.9	30.5	1884'80	19.3	1885
Somerset	Bristol	27.7	16	25.3	—2.4	33.0	1884	19.6	1885
Michigan.									
Kalamazoo	Kalamazoo	25.3	13	21.2	—4.1	35.0	1882	11.2	1885
Thornville	Lapeer	24.5	12	18.3	—6.2	34.8	1882	10.6	1885
Minnesota.									
Minneapolis	Hennepin	14.2	24	10.4	—3.8	29.9	1877	— 2.6	1875
Montana.									
Fort Shaw	Lewis & Clarke	25.7	19	24.4	—1.3	39.6	1877	2.4	1887
New Hampshire.									
Concord	Merrimack	22.5	29	21.2	—1.3	32.1	1868	14.7	1836
New Jersey.									
Moorestown	Burlington	31.2	26	27.1	—4.1	37.2	1865	21.6	1885
South Orange	Essex	29.6	18	25.2	—4.4	34.3	1877	22.8	1885
New York.									
Cooperstown	Otsego	21.0	35	16.1	—4.9	31.7	1857	10.5	1885
Palermo	Oswego	21.6	35	18.4	—3.2	27.8	1859	9.8	1885
North Carolina.									
Lenoir	Caldwell	40.0	16	35.9	—4.1	46.5	1887	30.3	1875
Ohio.									
N'th Lewisburgh	Champaign	30.1	57	27.1	—3.0	42.0	1851	19.0	38'56'75
Wauseon	Fulton	25.5	19	20.2	—5.3	35.4	1882	11.3	1875
Oregon.									
Albany	Linn	40.4	10	44.8	+4.4	47.9	1885	32.7	1887
Eola	Polk	39.7	18	42.6	+2.9	46.5	1885	31.0	1887
Pennsylvania.									
Dyberry	Wayne	22.2	24	17.4	—4.8	29.1	1867	13.3	1868
Grampian Hills	Clearfield	24.6	24	18.4	—6.2	32.0	1882	13.7	1885
Wellsborough	Tioga	26.5	9	18.8	—7.7	32.4	1882	16.7	1885
South Carolina.									
Statesburgh	Sumter	50.1	8	43.3	—6.8	55.1	1884	41.8	1885
Tennessee.									
Austin	Wilson	43.0	20	39.1	—3.9	51.1	1882	32.9	1885
Milan	Gibson	40.6	5	36.1	—4.5	48.0	1887	33.8	1885
Texas.									
Fort Concho	Tom Green	49.8	16	50.1	+0.3	56.5	1882	45.7	1885
New Ulm	Austin	56.2	15	55.0	—1.2	62.0	1882	52.6	1883
Vermont.									
Strafford	Orange	18.2	15	14.2	—4.0	25.7	1877	11.0	1885
Virginia.									
Bird's Nest	Northampt'n	41.1	20	33.9	—7.2	47.8	1880	33.9	1889
Wytheville	Wythe	37.2	24	31.5	—5.7	43.0	1884	29.8	1885
Wisconsin.									
Madison	Dane	20.9	22	14.1	—6.8	32.8	1878	8.1	1885
Washington.									
Fort Townsend	Jefferson	40.6	17	42.8	+2.2	47.0	1885	31.7	1887

MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperatures for the month occurred in the lower Rio Grande valley, where a reading of 92° was reported. Values above 80° were noted over southern and eastern Florida, southern Georgia, southeastern Alabama, east-central Texas, northern Louisiana, and southwestern California. At Sacramento, Cal., a maximum temperature of 80° was reported. The lowest maximum temperatures occurred in the valley of the Red River of the North, east-central Wisconsin, and northern Michigan, where they fell below 40°. Over the northeastern part of the middle plateau region of the Rocky Mountains the maximum temperatures were below 50°. At the following-named stations the maximum temperatures were higher than for any preceding February during the periods of observation: Savannah and Atlanta, Ga., and Shreveport, La., 1° above record of 1883; Little Rock, Ark., 1° above record of 1882;

Brownsville, Tex., 4° above record of 1884; San Diego, Cal., 2° above record of 1883; Sacramento, Cal., and Olympia, Wash., 1° above record of 1888. The most notable deficiencies occurred in the middle Atlantic states, the upper Mississippi and Missouri valleys, the upper lake region, and over the southern plateau, where, at stations, the maximum temperatures were 20°, or more, below the maximum values for the corresponding month of previous years.

The lowest temperatures in the United States were reported in the valley of the Red River of the North, where a reading of —43° was noted at Saint Vincent, Minn. The temperature fell below —30° over northern Minnesota, northern Dakota, and northeastern Montana. A reading of —32° was reported at Northfield, Vt. The minimum temperature fell to zero at stations north of an almost direct line traced from southern New England to central Arizona, and east of a line traced irregularly northward from central Arizona to northwestern Montana.

Unusually low temperatures have not been reported, and at a large majority of stations the minimum readings were considerably above the lowest values previously noted for February, notably in the northern and middle plateau regions of the Rocky Mountains and along the north Pacific coast, where, at stations, the minimum temperature was 20° to 30° above the lowest February values of previous years.

RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at Signal Service stations are given in the table of miscellaneous meteorological data. The greatest monthly ranges occurred over northern Minnesota, northern Dakota, and northeastern Montana, where they exceeded 80°. From this region the ranges decreased westward to the Pacific coast, where they were less than 30° over western Washington, and eastward to the Atlantic, where they amounted to less than 50° on the south New England coast. The monthly ranges also decreased from Montana southward to the Mexican border, where they averaged about 50°; southeastward to southern Florida, where they fell below 30°; and southwestward to west-central California, where they were less than 40°.

The following are some of the extreme monthly ranges:

Greatest.	°	Least.	°
Poplar River, Mont	92.0	Key West, Fla	25.0
Fort Assinaboine, Mont	84.0	Port Angeles, Wash.	25.0
Duluth, Minn	83.0	Galveston, Tex	27.0
Bismarck, Dak	82.0	San Francisco, Cal	36.0
Valentine, Nebr	81.0	Salt Lake City, Utah	43.0
Northfield, Vt.	80.0	Fort Grant, Ariz	43.0

LIMITS OF FREEZING WEATHER.

The southern and western limits of freezing weather for February, 1889, are shown on chart v. A line representing the southern limit is traced from the eastern coast of Florida, in about lat. N. 30°, westward through New Orleans, La., to south-central Texas, and thence south of west into the middle Rio Grande valley. A line indicating the western limit is traced from southwestern Arizona irregularly northwestward through California to the coast in about lat. N. 39°. As compared with lines representing similar data, traced for the preceding month, a southward advance of freezing weather is shown along the middle and east Gulf coasts and in the Colorado Valley. In southeastern Texas the line for February trends more to the northward. On the Pacific coast the limit of freezing weather remains about the same as in January, 1889.

FROST.

As compared with the preceding month the southern limit of frost in Florida has changed but slightly; no frost was, however, reported in the state west of the eighty-second meridian, whereas in January it was noted along the Gulf coast as far south as Manatee county. Along the middle Gulf coast frost occurred frequently during both January and February, while along the west Gulf coast and in southern Texas the southern limit in February was about five degrees farther north than in the preceding month. In southwest California south of the thirty-fifth parallel frost was reported on the 1st, 6th to 8th, 15th to 19th, and 27th.

TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for February, 1889:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
	°	°	°	°	°
Canby, Fort, Wash	48.8	44.3	4.5	46.4	45.2
Cedar Keys, Fla	69.8	48.1	21.7	58.3	54.0
Charleston, S. C	54.0	48.2	5.8	50.3	47.4
Eastport, Me	37.3	36.0	1.3	36.7	20.0
Galveston, Tex	63.0	50.0	13.0	54.6	54.4
Key West, Fla	77.2	67.3	9.9	71.5	69.4
New York City	36.0	30.0	6.0	32.3	28.0
Pensacola, Fla	59.0	51.0	8.0	55.4	51.9
Portland, Oregon	44.0	39.0	5.0	42.1	44.2

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for February, 1889, as determined from the reports of nearly 1,500 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data are given, for each Signal Service station, the total precipitation, with the departure from the normal. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The precipitation for February was below the normal in the plateau and Pacific coast regions, west Gulf states, and, with the exception of a slight excess in the upper lake region and south Atlantic states, in all districts east of the Mississippi River. In those districts where the precipitation was deficient the percentages of the normal were about as follows: Northern plateau, 7; middle Pacific coast region, 16; southern California, Oregon, and Washington Territory, from 41 to 44; middle plateau region, 48; New England, lower lake region, upper Mississippi and Ohio valleys, Gulf States, and southern plateau, from 58 to 67; middle Atlantic states, 83; and Florida, 92. It will thus be seen that the deficiency was greatest in the northern and central plateau regions and on the Pacific coast, where, as a whole, there was less than one-third of the normal precipitation for February.

Over the eastern Rocky Mountain slope, extreme northwest, Missouri and Rio Grande valleys, and, as previously stated, in the upper lake region and south Atlantic states, the precipitation of February was above the normal. It exceeded the normal by about 40 per cent. over the eastern Rocky Mountain slope, and in the lower Rio Grande valley there was more than double the normal amount. In other districts where there was an excess the departures were not marked.

With respect to the marked deficiency of rainfall on the Pacific coast the months of January and February were not unlike, and therefore the aggregate rainfall for these months in that region was unusually small. There was, however, in California a decided excess over the normal in both November and December, 1888, but on the north Pacific coast a marked